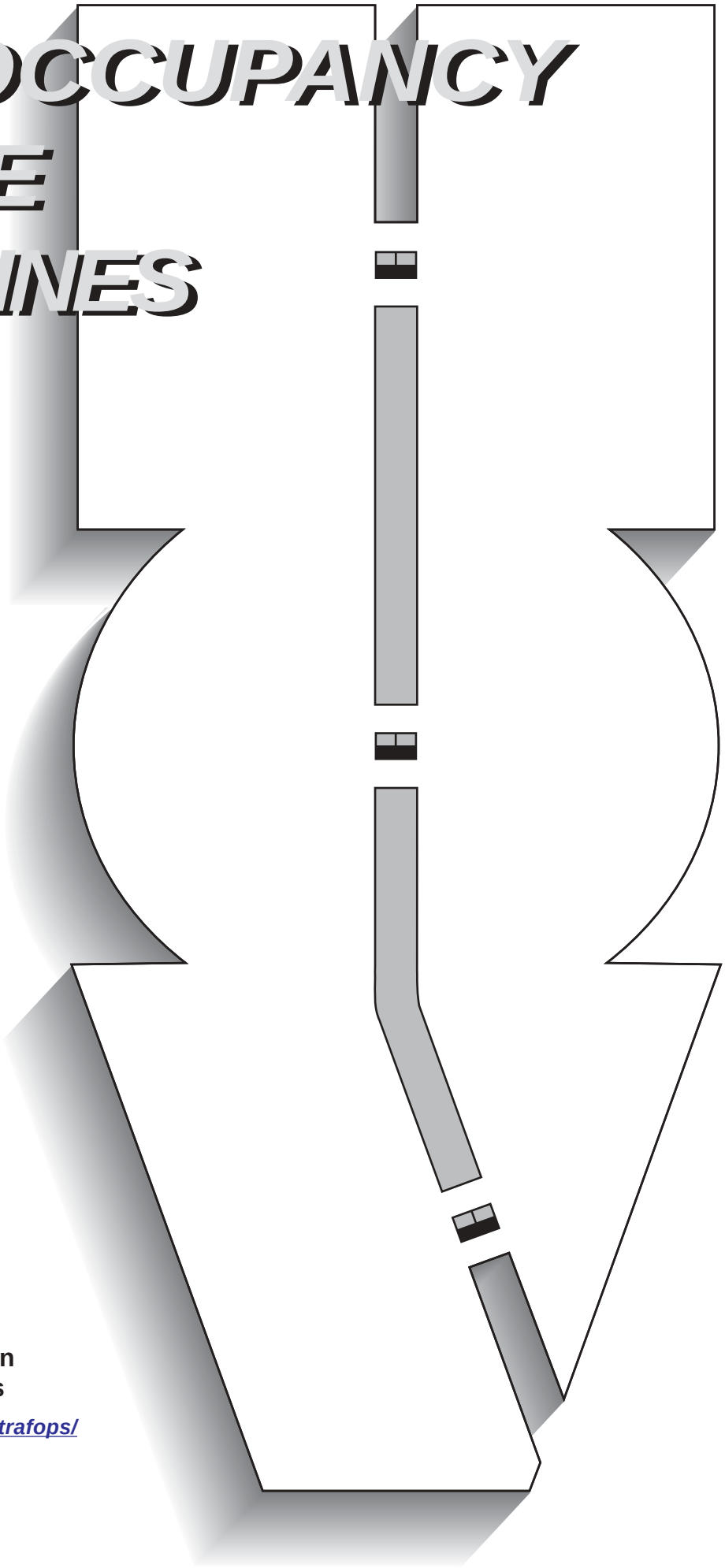
HIGH-OCCUPANCY VEHICLE GUIDELINES

for Planning, Design and Operations



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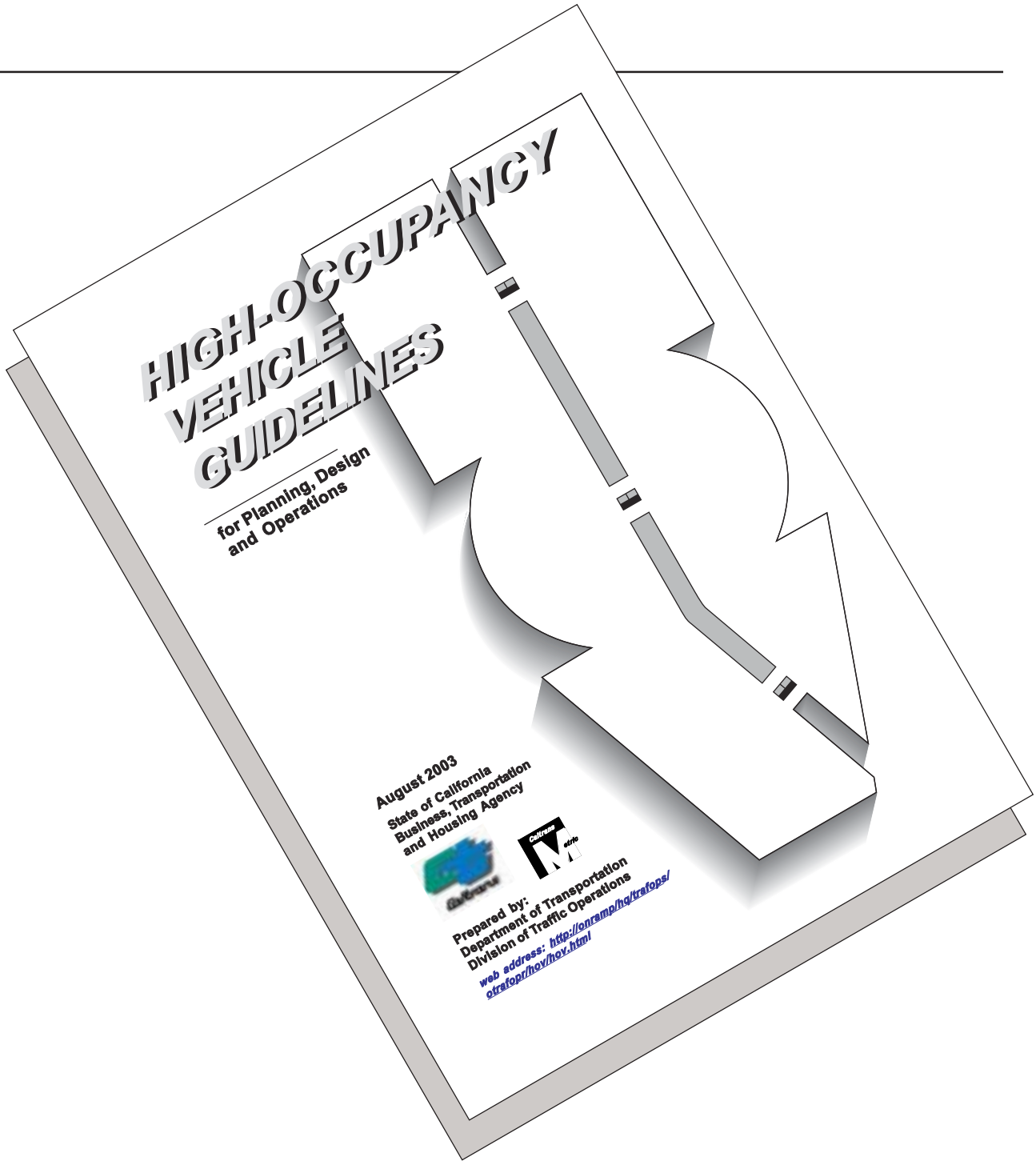
State of California
Business, Transportation and Housing Agency

Prepared by:
Department of Transportation
Division of Traffic Operations

web address: ***http://onramp/hq/trafops/otrafopr/hov/hov.html***



This guidance was prepared by the California Department of Transportation (Caltrans) Headquarters, Division of Traffic Operations, High-Occupancy Vehicle Systems Branch, 1120 N Street, Sacramento, California 95814.

This guidance is an update of the July 1991 Guidelines for Planning, Design and Operations of High-Occupancy Vehicle (HOV) facilities. It provides statewide uniformity of the development of HOV facilities and details the areas of responsibility for implementation. All measures are expressed in metric units.

Questions and comments regarding information contained in this guidance can be directed to Antonette C. Clark, HOV Systems Branch Chief at (916) 653-4552.

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AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
AHS	Advanced Highway Systems
AQMP	Air Quality Management Plan
ATMS	Advanced Traffic Management System
ATSD	Advanced Transportation System Development
AVR	Average Vehicle Ridership
BT&H	Business, Transportation and Housing Agency
CARB	California Air Resources Board
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CIP	Capital Improvement Program
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Program
CMS	Changeable Message Sign
CTC	California Transportation Commission
CTP	California Transportation Plan
CVC	California Vehicle Code
DOT	Department of Transportation
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ETC	Electronic Toll Collection
FCAA	Federal Clean Air Act
FCR	Flexible Congestion Relief
FHWA	Federal Highway Administration
FSP	Freeway Service Patrol
FTA	Federal Transit Administration
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HNS	Highways of National Significance
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
HTF	Highway Trust Fund
IC	Interchange
IGR	Intergovernmental Review
IRRS	Interregional Road System
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation System
ITSP	Interregional Transportation Strategic Plan
KP	Kilometer-Post
LOS	Level of Service
LRT	Light Rail Transit
LTC	Local Transportation Commission
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MTDB	Metropolitan Transit Development Board
MTS	Metropolitan Transit System
MUTCD	Manual on Uniform Traffic Control Devices
NEPA	National Environmental Policy Act
NHS	National Highway System
O&D	Origin and Destination
OC	Overcrossing
OCTA	Orange County Transportation Authority
OCTC	Orange County Transportation Commission
PCC	Portland Cement Concrete
PE	Project Engineer
PHV	Peak Hour Volume
PM	Post-Mile
PMS	Pavement Management System
PPH	Persons Per Hour
PR	Project Report
PS&E	Plans, Specifications and Estimate
PSR	Project Study Report
PSSR	Project Scope Summary Report
PUC	Public Utilities Commission
RCR	Route Concept Report
RFP	Request for Proposals
RTIP	Regional Transportation Improvement Plan
RTPA	Regional Transportation Planning Agency
RW	Right of Way
SACOG	Sacramento Area Council of Governments
SANDAG	San Diego Association of Governments
SCAG	Southern California Association of Governments
SHA	State Highway Account
SHOPP	State Highway Operations and Protection Program
SIP	State Implementation Plan
SSD	Stopping Sight Distance
STAA	Surface Transportation Assistance Act
STIP	State Transportation Improvement Program
TASAS	Traffic Accident Surveillance Analysis System
TCM	Transportation Control Measure
TCR	Transportation Concept Report
TDM	Transportation Demand Management
TDP	Transportation Development Plan
TMA	Transportation Management Association
TMC	Transportation Management Center
TMP	Transportation Management Plan
TOS	Traffic Operations System
TRB	Transportation Research Board
TSM	Transportation Systems Management
UC	Undercrossing
VMT	Vehicle Miles Traveled
VPH	Vehicles Per Hour
VPHPL	Vehicles Per Hour Per Lane

Chapter 3 ♦ HOV Geometric Design

Chapter 4 ♦ HOV Ingress and Egress

Chapter 5 ♦ HOV Signs and Markings

Chapter 6 ♦ HOV Enforcement

Foreword

The High-Occupancy Vehicle (HOV) lane system is used as a cost-effective operational strategy to maximize the people-carrying capacity of freeways. HOV facilities are a proven multimodal operational strategy supported by the Federal Highway Administration (FHWA), and local and regional agencies to improve both the current and future mobility, productivity, and quality of travel associated with congested transportation corridors in metropolitan areas. Lastly, HOV lanes have been used as a viable alternative, and in most cases is the only alternative that meets the federal air quality conformity standards for capacity-increasing projects in metropolitan areas.

California's HOV lanes were initially considered as an innovative strategy, adding a bus-only lane during the reconstruction of the San Francisco-Oakland Bay Bridge in 1962. As traffic demand continued to exceed the capacity of many of the state's metropolitan freeways, the California Department of Transportation (Department) and its regional partners opened HOV lanes in the most heavily congested areas of the state; that is, where HOV lanes offered the greatest potential benefit. The statewide HOV system has grown from a segmented 260 lane-miles in 1990 to the current (December 2003) comprehensive system network in excess of 1,100 lane-miles, where lane-miles are directional miles.

For most situations, retrofitting an HOV lane on an existing freeway requires some compromises in design standards. Back in 1987, FHWA's Procedure Memorandum D6103 introduced, under certain conditions, exceptions to AASHTO design standards. But it offered little guidance on acceptable geometric reductions. This was not surprising considering HOV facilities were still a relatively new development and few design guidelines were available at the time. In 1989, in response to District requests for guidelines to provide statewide consistency and uniformity, the Division of Traffic Operations began preparing the initial guidelines. The Division staff organized and chaired a committee of representatives from the metropolitan Districts, several Headquarters Divisions, the CHP, FHWA and private consultants. Without exception, the continued participation and cooperation received from the committee members was outstanding. It is their contribution and dedication that made the update to these guidelines possible.

Introduction

These guidelines are not intended to supersede Caltrans' Transportation Planning Manual, Project Development Procedures Manual, Highway Design Manual, Manual on Uniform Traffic Control Devices (MUTCD) and California Supplement to the MUTCD (which replaces the Caltrans' Traffic Manual), or other inter-Department manuals, procedures or practices. These guidelines are not, and should not be used as a set of standards. The Guidelines are advisory in nature and are to be used only when every effort to conform to established standards has been exhausted. When conformance is not possible, the deviation must be documented by a sound and defensible analysis and an approved design exception fact sheet.

The goal of these guidelines is to provide a "how to" document for planners, designers and operators of mainline HOV facilities. *Since individual site characteristics vary, only typical, full standard design scenarios can be presented. For situations not discussed, Districts are advised to consult the appropriate District and Headquarters representatives for advice and consent. For a list of HOV persons and contacts, please visit the following Intranet address at http://onramp/hq/trafops/otrafopr/hov/hov.html. This website is a valuable resource, updated regularly for the most current HOV Program guidance, inventory, reports, and related links.

Thirty years have passed since the opening of the bypass lanes at the San Francisco-Oakland Bay Bridge toll plaza. But it wasn't until the mid-1980's that operational and research data on HOV facilities started to accumulate. This means that guideline updates and revisions will be necessary, as new data becomes available. Through the years much has been learned on the subject although it is recommended that the Districts continue to conduct "before and after" operational studies for HOV projects implemented. Districts are encouraged to support continuous monitoring of the performance of their specific HOV facilities. It is the performance and evaluation of existing operational strategies; plans and services that provide the basis for making revisions to this guide and improved operations of the statewide HOV program. Headquarters' Division of Traffic Operations will, simultaneously, be conducting studies to resolve HOV issues, which are generic in nature and applicable statewide. The results from District and Headquarters' studies, with participation from outside agencies such as the Federal Highway Administration (FHWA), the California Highway Patrol (CHP) and the California Air Resources Board (CARB), will also continue to be used to update these HOV guidelines. A coordinated and cooperative effort is, therefore, needed to ensure these guidelines reflect the latest experience and operational data for planning, designing and operating HOV facilities.

Further discussion on HOV facilities may be found in other publications such as AASHTO's Guide for High-Occupancy Vehicle (HOV) Facilities, June 2003 and Texas Transportation Institute NCHRP Report 414: HOV Systems Manual. Should the District use recommendations from other publications, which either deviate from or are not contained in this document, it is recommended that the District consult with the appropriate Headquarters and District functional units for concurrence.

*Refer to the Division of Traffic Operation's "Ramp Meter Design Guidelines" for guidance on HOV bypass lanes on ramps. For the latest information regarding the Ramp Metering Program, please visit the intranet website address at http://onramp/hq/trafops/otrafopr/frwy_ops/frwy_ops.htm.